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Briefing Paper: Accelerated Erosion Resulting From Irrigation of the Bell Rapids Farm Project.

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Briefing Paper: Accelerated Erosion Problems at the Hagerman Fauna Sites National Natural Landmark

I. OVERVIEW

A. Introduction

Accelerated erosion associated with crop irrigation at the Bell Rapids farm project has been a matter of concern since 1983. Particular attention has been focused on areas in the Hagerman Fauna Sites National Natural Landmark (see map), but erosion damage has occurred in surrounding areas as well.

Several actions have been initiated addressing these problems: groundwater investigations have been conducted to determine the source of water; spring flows and a landslide have been monitored to establish trends and document losses; and meetings have been held with Bell Rapids representatives to discuss these problems. In spite of these efforts, few actions have been implemented to actually reduce erosion losses.

More aggressive action is needed in controlling irrigation runoff. Accomplishing this will result in both savings in irrigation costs and conservation of natural resources.

B. Background

The 4,187 acre Hagerman Fauna Sites National Natural Landmark was designated in May, 1975. The area has an international reputation among paleontologists as the most significant and important location of Upper Pliocene terrestrial fossils in the world. This is a rare and valuable resource from which much remains to be learned. It is essential that this resource be protected to preserve the story of the natural history of this area during the Pliocene epoch.

Plateau lands adjacent to the fauna sites were transferred to farming interests in about 1970 under the Desert Land Entry Act of March 3, 1877. Today, the Bell Rapids Farm Project consists of approximately 27,000 acres farmed by numerous individual farmers. Water is supplied to the project via two pumping stations located on the Snake River. Two canals, located on the plateau above the river, distribute water across the farm project. The entire irrigation system including the main pumps, canals, booster pumps, and mainlines are managed by the Bell Rapids Mutual Irrigation Company (BRMIC).

II. EROSION PROBLEMS

A. Mass Failure

The Bureau of Land Management (BLM) became concerned with increasing erosion within the area in 1983. In the spring of that

year a major landslide was discovered in the Snake River Canyon wall (photo 1). Moisture along the headcut of the slide area indicated it may have resulted from subsurface saturation. The slide has continued to grow until today it has affected approximately 30 acres (photos 2-5). A number of springs have appeared along the canyon rim in recent years in close proximity to the two major irrigation canals.

B. Overland Flow

Gully erosion caused by irrigation runoff has caused significant damage in some areas. The greatest soil losses have been in areas just downslope from irrigation mainline flush valves. These valves are opened once or twice per year allowing the water in the line to cascade downslope unchecked (see photos 6-10).

Another problem area has been the access road down the canyon wall to the two main pump stations. Overland flow is allowed to accumulate on the road for long stretches before flowing into natural drainages, cutting a deep gully between the roadway and the drainage.

The third major runoff problem is associated with over-application of cropwater and/or poor handline maintenance. Contour furrows from cultivation nearly always run perpendicular to the canyon rim in this area. As surface water accumulates it begins to flow toward the rim, downcutting as it goes.

C. Off-Road Vehicles (ORV)

Recreational motorcycle use in the area has contributed to erosion problems in three areas - a hill climb area at the "Horse Quarry," a hill climb above Yahoo Creek, and an area near "Beer Nob."

III. ACTIONS INITIATED

A. Consultation and Coordination

Over the past two years several meetings have been held with representatives of the BRMIC Board of Directors (Section V. Chronology). The main purpose of these meetings has been to encourage actions which will reduce erosion rates in the area.

B. On-Site Investigations

1. Groundwater. In 1983, the U. S. Geological Survey (USGS) was contacted about evaluating the groundwater situation at Hagerman. Their report, Evaluation of Hydrologic Processes Affecting Soil Movement in the Hagerman Fauna Area, Hagerman, Idaho (84-4137) was released in July, 1984. This study identified a perched aquifer underlying agricultural ground as being the source of groundwater seepage in the area. Recharge

to this system was determined to be from irrigation canal seepage.

A meeting held in August, 1985, (see Chronology No. 20), resulted in testholes being drilled to gain information on the perched aquifer. Eleven holes were drilled in March, 1986. Five of these were equipped with recorders which will constantly measure fluctuations in groundwater levels. The other six are measured on a monthly basis. All testhole monitoring is being done by the USGS.

2. ORV. BLM funded a paleontological survey of the Hagerman area in 1983. The report titled Hagerman Fauna Area Paleontological Survey, concluded that ORV activity was seriously damaging several important localities within the area and further recommended that ORV use within the area cease. The area was officially closed to ORV use beginning May 1, 1985.

3. Soil. A major landslide occurred within the area in 1983. Observations over the next two years indicated that the slump was growing rapidly with adjacent hill slopes showing signs of slipping. In January, 1985, soil transects were established along the headwall of the major slide area to monitor the rate at which the slope was collapsing. By June, 1986, over 90 feet of soil had been lost on each of two of the five transects (photos 2 and 3).

4. Overland Flow. Several problem areas have been identified which need immediate attention. Mainline flush valves were inventoried and several leaking valves have been replaced. Very little progress has been made with the problems associated with handline maintenance and over-application of water.

5. Springflow. In March, 1985, the Soil Conservation Service (SCS) began monitoring springflows at two sites at the request of the BRMIC. In April, 1985, the BLM began monitoring springflow at five sites. Flow measurements seem to indicate a cyclic trend associated with filling and emptying the main canals. Flows ranged from a measured low of 117 gallons/minute in July to a measured high of 270 gallons/minute in November. This indicates a lag time of approximately three months between filling or emptying the canal and a corresponding change in springflows at the canyon wall.

IV. CURRENT SITUATION

A. Consultation and Coordination

Recent discussions (7/86) have been held with the BRMIC concerning the possibilities of lining priority sections of both canal systems and implementing measures to stop accelerated erosion at

flush valves. The BLM still believes all commitments should be documented in writing accompanied with an implementation schedule. To date, no action plan has been developed by the irrigators.

B. On-Site Investigations

The SCS's monitoring efforts ended at the end of the 1985 irrigation season. The BLM has continued to monitor springflow and soil losses through the 1986 irrigation season.

The USGS began monitoring the groundwater system via testholes in March, 1986. This effort is currently funded through September of 1986.

C. Citations

Efforts to get individual farmers to correct overland flow problems have met with little success. For this reason, the BLM is considering issuing citations to those individuals who allow their irrigation runoff water to cause erosion on public land. This will focus more attention on the need to control irrigation water and may cause implementation of improved irrigation techniques.

V. CHRONOLOGICAL DOCUMENTATION OF DIALOGUE ADDRESSING HAGERMAN EROSION PROBLEMS

1983 - Mass Failure Occurred

1. 20 May - Field exam report by Karl Gebhardt (BLM) on erosion problems at Hagerman.
2. 23 May - The National Natural Landmark Status Report by the National Park Service documents the landslide.
3. Dec - Hagerman Fauna Area Paleontological Survey - released.

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4. Jul - Evaluation of Hydrologic Processes at Hagerman (report 84-4137) was released by USGS.
5. 5 Jul - Field exam by BLM to evaluate sources of irrigation runoff.
6. 2 Aug - Field exam by BLM evaluates erosion problems.
7. 13 Aug - BRMIC Board of Directors invited BLM to monthly meeting to discuss erosion problems. Copies of USGS report 84-4137 were distributed to Board.
8. 1 Nov - Field exam by BLM of the canal lining in the Bell Rapids canal. Recommendation made for lining repairs.

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9. 4 Jan - Meeting between BRMIC Board representatives and BLM. Board agrees to repair existing lining but does not want to do additional lining until SCS evaluates problem.
10. 9 Jan - Soil monitoring begins.
11. 26 Mar - SCS begins monitoring.
12. 9 Apr - Springflow monitoring begins by the BLM.
13. 15 Apr - Telephone conversation between BRMIC project manager and BLM. Board has arranged for SCS to core sample the canal bottom and monitor water seepage at the landslide.
14. 24 Apr - Meeting between BRMIC Board reps, BLM, and SCS. Deteriorated sections of concrete lining in Bell Rapids Canal replaced. Flush valves on mainlines replaced where needed. SCS monitoring initiated 3/19/85.
15. 1 May - "Restricted Vehicle Use Closure Order" closing area to ORV's went into effect.
16. 23 Jul - Letter to BRMIC Board from BLM. Unacceptable erosion is still occurring. Source of overland flow was discussed as was groundwater source. Immediate Board action was requested. An action plan and schedule was requested by 8/30/85 from Board.
17. 25 Jul - Meeting between BRMIC Board reps and BLM. Erosion problems are still occurring, immediate steps must be taken.
18. 29 Jul - Letters to three individual farmers from BLM discussing overland flow problems. Requested a written response regarding mitigation by 8/30/85.
19. 31 Jul - Letter from BRMIC Board to the BLM. The SCS will monitor springs at two week intervals and has taken samples from canals. Canal lining repairs have been made. Idaho Power Co. will analyze system for energy loss. Water meters for individual farmers will conserve water. Other measures will be taken as needed throughout season.
20. 6 Aug - Meeting between BRMIC Board, McClure's staff, SCS, and BLM. The BLM will drill testholes to monitor groundwater. The Board will test canal infiltration with mitigation occurring prior to 1986 irrigation season. The Board will inform individual farmers of overland flow problems. The BLM will prepare a land acquisition package.
21. 22 Aug - A letter from BRMIC Board to BLM summarizing 8/19 Board meeting. BRMIC Board will run infiltration tests. All parities will meet 11/85 to review data.
22. 11 Sep - Letter from BLM to BRMIC Board discussing overland flow. The BLM proposed a written agreement outlining points of the 8/6/85 meeting ("letter of intent"). Overland flow is causing unacceptable damage.
23. 15 Sep - Field exam by BLM documenting overland flow. Damage was severe along pump access road due to heavy rains.

24. 28 Oct - Letter from BRMIC Attorney to BLM. BRMIC irrigation losses are negligible. Springflow is affected by weather, not irrigation. Infiltration losses are less than average. Record ppt & runoff the past 3 winters.
25. 13 Nov - Meeting between BRMIC Board reps, SCS, Solicitors office, and BLM to discuss monitoring data and infiltration study. The Board expects to line priority sections of canals. The Board will develope a land acquisition proposal. The Board will send a letter of intent with extend and schedule of needed canal repairs. Overland flow control was stressed.
26. 17 Dec - Letter from BRMIC Board rep to BLM. The Board wants results of testholes before money is spent on lining.

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27. 2 Jan - A letter from the BLM to the BRMIC Board reps. The Board letter of 12/17/85 contradicts agreement made 11/13/85 where high priority canal segments were to be lined. Various studies confirm canal losses, presence of a perched aquifer and accelerated erosion. Immediate action is requested. If the Board commitments cannot be kept please notify the BLM by 1/30/86.
28. 8 Jan - Meeting between BRMIC Board reps and BLM. The Board does not want to line any canal until problem is verified by testholes. The Board will test canal seepage with dyes. The BLM will submit an action plan for Board review by 1/20/86.
29. 22 Jan - Letter from BRMIC Board rep to BLM. The Board did not receive the BLM action plan in time for 1/20/86 meeting. The Board is in general agreement with the BLM "buyout" idea.
30. 23 Jan - Letter from BLM to BRMIC Board. The BLM is concerned over a lack of commitment by the Board to address erosion problems. The BLM received funding for groundwater monitoring. Requested the Board to begin measures to correct erosion. The BLM action plan was outlined. The BLM requested a written action plan by 2/28/86 from the Board.
31. 7 Feb - Letter from BLM to BRMIC Board rep. Criteria for locating and information desired from testholes was outlined. The BLM "buyout" is a remote possibility.
32. 5 Mar - Testhole drilling began by USGS.
32. 21 Mar - Drilling completed.
33. 21 Jul - The BRMIC invited the BLM and the USGS to their monthly meeting to update members on monitoring results. The BLM urged BRMIC to take more aggressive actions in dealing with erosion problems.

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